

**TOXAPHENE**  
**CAS No. 8001-35-2**

First Listed in the *Second Annual Report on Carcinogens*

## **CARCINOGENICITY**

Toxaphene is *reasonably anticipated to be a human carcinogen* based on sufficient evidence of carcinogenicity in experimental animals (NCI 37, 1979; IARC, V.20, 1979; IARC S.7, 1987). When administered in the diet, technical-grade toxaphene increased the incidences of hepatocellular carcinomas in mice of both sexes and thyroid follicular cell adenomas in rats of both sexes.

There are no adequate data available to evaluate the carcinogenicity of toxaphene in humans. (IARC V.20, 1979). Two cases of aplastic anemia were associated with dermal exposure to a toxaphene lindane mixture. In another study, an increased frequency of chromosomal aberrations was observed in the lymphocytes of workers exposed to toxaphene.

## **PROPERTIES**

Toxaphene is a mixture of chlorinated camphenes that occurs as a waxy yellow or amber solid, with a pleasant odor. It is soluble in hexane, petroleum ether, chloroform, ethanol, and acetone. The exact composition of the mixture is not known. Toxaphene contains a total organic chloride content of 67-69% by weight. When heated to decomposition, it emits toxic fumes of hydrochloric acid and other chlorinated compounds. Toxaphene is available as a wettable powder, emulsifiable concentrate, dust, granule, bait, oil, and emulsion.

## **USE**

Toxaphene is used primarily as an insecticide. Use of toxaphene increased as the use of DDT (see Section III.B) was phased out. In 1982, the EPA initiated restrictions on all toxaphene uses. Existing stocks of toxaphene could then only be used in selected markets for the following 4 years, after which applications would be allowed only on an emergency basis. (SRI 1984; DPIM Rep. No.5, 1987; Farm Chem. Hdbk., 1985). About 85% of the toxaphene used in this country was for the control of cotton insect pests; the remaining 15% was used to control insect pests on livestock, poultry, and a few field crops other than cotton. In 1976, farmers used 30 million lb of toxaphene on cotton crops, 2.2 million lb on soybeans, 1 million lb on sorghum, and 400,000 lb on peanuts, mainly in the southeast and delta states (IARC V.20, 1979).

## **PRODUCTION**

Chem Sources identified two suppliers of analytical grade toxaphene among the four listed for 1990 (Chem Sources, 1991). In 1986, there was one producer and two suppliers of toxaphene in the United States, but no production data are available for toxaphene (USITC 1987; Chem Sources, 1986). Only one company produced an undisclosed amount of toxaphene in 1984 (USITC, 1985). In 1982, it was reported that toxaphene represented over 30% of the total U.S. chlorinated hydrocarbon insecticide market. U.S. production of chlorinated hydrocarbon insecticides in 1982 totalled 16 million to 20 million lb, imports were 4 million lb, and exports

were 10 million to 12 million lb (SRI, 1984). Toxaphene was not included in the 1979 TSCA Inventory. During 1976 through 1978, U.S. companies produced about 39 million to 42 million lb of the compound. Toxaphene first was produced commercially in the United States in 1974 (IARC, V.20, 1979).

## **EXPOSURE**

The primary routes of potential human exposure to toxaphene are ingestion of contaminated food and water, dermal contact, and inhalation. Persons with the greatest possible risk of exposure to toxaphene are manufacturers of toxaphene, cotton farmers, and pesticide applicators. A National Occupational hazard Survey (NOHS) estimated that 203 workers were exposed to toxaphene from 1973-74 (HSDB 1979). estimated that only 100 industrial workers possibly were exposed (this number probably includes only workers involved in the manufacture of the insecticide). No estimates are available on the number of people potentially exposed through agricultural use and handling, but the number may be significant because toxaphene represented 41% of the total insecticides used on cotton crops in 1976. The recommended threshold limit value time-weighted average (TLV-TWA) is 0.5 mg/m<sup>3</sup> with a short-term exposure limit (STEL) of 1 mg/m<sup>3</sup> (ACGIH, 1986). In the National Soils Monitoring Program, investigators found few toxaphene residues (4.2% of 1,729 sites sampled), and the range of toxaphene residues detected was 0.1-11.72 ppm in positive samples. However, the material can be extremely persistent in soil receiving direct application, for example, cropland. In one study, 45% of the toxaphene applied to a sandy loam soil in 1951 was detectable 20 years later. In some instances, agricultural runoff has polluted local lakes and streams (IARC, V.20, 1979). Additional exposure information may be found in the ATSDR Toxicological Profile for Toxaphene (ATSDR, 1996d).

## **REGULATIONS**

EPA regulates toxaphene under the Clean Water Act (CWA), Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), Food, Drug, and Cosmetic Act (FD&CA), Resource Conservation and Recovery Act (RCRA), Safe Drinking Water Act (SDWA), and Superfund Amendments and Reauthorization Act (SARA). Under CWA, EPA published a water quality criteria document for the protection of human health. EPA has established a reportable quantity (RQ) of 1 lb for toxaphene under CWA and CERCLA. A rebuttable presumption against registration (RPAR) has been issued under FIFRA. Tolerances for residues of toxaphene in or on raw agricultural commodities have been established under FD&CA. Under SDWA, EPA established a maximum contaminant level (MCL) of 0.005 mg/l and has proposed a maximum contaminant level goal (MCLG) of 0 mg/l. SARA has added toxaphene to its list of toxic chemicals with a general threshold amount set at 500 or 10,000 lb/yr. The OSHA standard for toxaphene is 0.5 mg/m<sup>3</sup> as an 8-hr time-weighted average (TWA) with a STEL of 1 mg/m<sup>3</sup>; OSHA adopted this standard for neuropathy. OSHA also regulates toxaphene under the Hazard Communication Standard and as a chemical hazard in laboratories. Regulations are summarized in Volume II, Table B-144.